25th October, 2002

To:

Miriam Goldberg
2001 West Beltline Highway
Suite 200
Madison, WI 53713

Dear Ms. Goldberg:

We are glad to enclose our final report per contract #WCEC0007-1 signed between Xenergy Inc. and IPMVP Inc. It summarizes the findings of the review of Demand Response Baseline Protocol document, which was prepared by Xenergy for California Energy Commission, and outlines a suggested approach to convert this report into a national DR protocol.

Apart from this cover letter, the following documents are enclosed:

1. The review report
2. List of review questions
3. List of reviewers
4. Review Comments in a tabular format

We would like to request you to acknowledge the receipt of this report as the final deliverable per the terms of the sub-contract between IPMVP Inc. and Xenergy Inc.

We will be glad to answer any questions that you may have and we look forward to continuing our collaboration with Xenergy Inc. in future.

With regards,

Sincerely,

Satish Kumar and Steve Kromer

cc: Mike Messenger, CEC, IPMVP Executive and Technical Committee

California Energy Commission's Demand Response Protocol - IPMVP Report

Steve Kromer and Satish Kumar, IPMVP, Inc.

1.0 BACKGROUND

The California Energy Commission (CEC), through its contractor Xenergy, secured the services of the IPMVP to review a draft Demand Response (DR) protocol. The IPMVP team was charged with

- arranging a wide peer review of the document and
- assessing the practicality of adopting the protocol as part of IPMVP's family of documents.

The activities required to quantify the value in Demand Response programs often involve highly technical calculations requiring professionals skilled in engineering, statistics and accounting. Accordingly the IPMVP sought out experts in energy engineering and M&V to participate in this review. However the quantification and apportionment of value generated by Demand Response activities also often requires common sense judgement regarding what-if scenarios that exist in the real world. Having worked through many of these issues while developing the original IPMVP document, we performed this review with the belief that the most important first step is to create a framework that any sensible person could understand and that can be adapted to meet the needs of many participants and situations.

2.0 ROLE OF IPMVP

The IPMVP has been involved in establishing protocols for the past eight years. In that time we have had the opportunity to experience the joys and frustrations of bringing together disparate groups and forging consensus. Perhaps the most important lesson is that there can be no useful discussion if participants do not share a common vocabulary. In any new field there is necessarily new language

to describe unique situations. However, ultimately there is nothing new under the sun. Participants are highly encouraged to maintain discipline in establishing framework terminology and maintaining a glossary of most-used terms.

The IPMVP is a document, a committee and a concept. The core concept of IPVMP is that parties involved in contracts to reduce energy use should have a common language with which to structure and manage the settlement of those contracts. The IPMVP was designed to allow parties flexibility in designing M&V procedures that make sense for each contract.

2.1 Role in Demand Response Programs

Over the past few years energy efficiency programs involving instantaneous demand reductions have grown across the country. These programs, which may be offered by Utilities, Independent System Operators (ISOs), or some other organization have more or less the same goals, to manage customer load at peak demand times by signaling participants but each has evolved a slightly different settlement process. To date there has been no effort to standardize the methods of assessing the magnitude of load reductions. The California Energy Commission contracted with Xenergy and the IPMVP to determine the feasibility of creating a protocol of standard methods. The IPMVP agreed to leverage its experience in creating M&V protocols and its access to M&V professionals around the world in two ways

- by expediting review of Xenergy's report and
- by considering adopting the work as part of the IPMVP.

This report summarizes the IPMVP DR team's approach and conclusions and lays out a plan for further activities. The comments are made with the intent of assuring that this study be as useful as possible to a broad national and international audience.

2.2 State of the Demand Response Programs

There is little certainty in the current wholesale and retail electric power markets. Several regions (ISOs), states and utilities have DR programs as part of their load management strategies. While there are differences in the supply and demand characteristics of each jurisdiction, the basics of baselining, modeling, forecasting and settling remain the same. The popularity of DR programs may wax and wane, but the basis for quantifying the results will outlast the current chaos in the retail energy industry.

The goal of all DR programs is to manage supply and demand during peak periods. Each jurisdiction develops a program that combines peak generation and demand reduction. Some areas have invested more heavily in peaker plants. Some areas rely on conservation and demand-responsive loads. In both cases there is a need to better understand whether a single set of methods can be adopted to quantify the DR activities.

The settlement of generation relies on direct metering. The settlement of DR is conceptually simple, but practically more difficult to achieve a fair result at an acceptable cost. Each jurisdiction should have the freedom to use a settlement process that best matches its load characteristics and event drivers, i.e. weather.

All DR programs are contracts with terms and conditions for both parties. All quantitative assessments of DR must be considered within the contractual environment, including ease of use, fairness and cost-effectiveness of settlement procedures.

3.0 The Review Process

The CEC contracted with the IPMVP, through Xenergy, to conduct an industry-wide review of Xenergy's work. The purpose of the review was both to validate the methods employed in the study and to validate the perceived need for a standard. The IPMVP agreed to manage a review of the draft report and deliver a compilation of the comments for use in the final report. Subsequently, the IPMVP decided to invite the IPMVP Technical Committee to review the report as well.

The IPMVP DR team sent out invitations to ~50 people considered expert or actively interested in DR issues. We received 14 responses. The compiled comments of the invited reviewers are provided in a separate document. In addition, the IPMVP Technical Committee (IPMVP-TC) reviewed the document and the invited review comments and provided specific guidance on the feasibility of converting the draft report into a protocol.

This review addresses the comments on the technical content of the Xenergy report separately from comments and suggestions related to the development of an IPMVP-DR protocol. In general, both the invited reviewers and the IPMVP-TC were highly supportive of the quality of the draft report and the findings and recommendations. Our plans initially called for submission of compiled review comments leading to a final report. The final report was to be considered for adoption as an IPMVP document. However, having reviewed the comments, and with additional comments from the IPMVP technical committee, we believe that adoption by IPMVP will require additional effort

3.1 Overview of Review

Both the invited reviewers and the IPMVP-TC found the report to be of high quality. It substantially fulfills the CEC's goal of providing a survey of existing techniques and documenting participant reaction to existing DR baseline methods The substantive issues raised by the reviewers are presented below in two sets. The first are questions that need to be answered in the final report and suggestions for improving the final report. The second set contains recommendations for further research and validation needed prior to creating an IPMVP protocol.

3.1.1 General Issues

The document will benefit if the first two sections can be reorganized. Specifically, general overview should be first and detailed review of approaches should be later.

3.1.2 Technical

1. In the event that more than one baseline option is allowed, what are the criteria for selecting one option over another? Was there a weighting of factors that led Xenergy to the conclusion about the best baseline strategies?
2. Did Xenergy use data sets representative of the broad range of load types and conditions found in California?
3. When using weather regression, is it sufficient to select an arbitrary balance point for all buildings? What are the pros and cons of allowing building-specific balance points?
4. The report is bulky and overly technical in its current form. The final report should emphasize the results, conclusions and recommendations and place the technical work in an appendix.

3.1.3 Jurisdictional

While the majority of reviewers support a national protocol, several reviewers did not appreciate that their baseline methodologies might change if IPMVP adopted a standard. This is understandable but does not constitute sufficient grounds to deter development. The added efficiency for multi-market participants must be considered as well.

The complete list of compiled comments warrants review, but does not materially alter our conclusion that an IPMVP DR Protocol is worth pursuing.

3.2 IPMVP Technical Committee Review

As part of the review process, IPMVP also received comments from the IPMVP Technical Committee. A list of committee members is provided at the end of this report in Appendix A. More information about IPMVP Technical Committee can be found at http://www.ipmvp.org/committees_tech.html. The IPMVP-TC review was not planned in the original contract, but was added at their (IPMVP-TC) request. The review was specifically aimed at providing guidance on the possibility of converting the Xenergy report into an IPMVP protocol. However some of the comments are relevant to the final report as well.

3.2.1 IPMVP Technical Committee

During the September 18th conference call, the Technical Committee discussed the invited-reviewer comments. The TC agreed that the DR Draft report constituted a good start, but that additional work would be needed prior to IPMVP adoption. Specifically, the TC determined that a dedicated IPMVP DR subcommittee should conduct a more thorough review of the load forecast models, particularly those developed for ASHRAE.

3.2.2 Nexant

Nexant provided additional comments worthy of consideration prior to IPMVP adoption. Nexant evaluated DR programs for the CEC and came to a similar conclusion as Xenergy as to the (potentially) most appropriate baseline procedures. These comments warrant a complete reading on their own.

3.2.3 ASHRAE Reports

In reviewing the Xenergy report to comment on the possibility of converting the Xenergy report into an IPMVP protocol, Dr. Haberl from Texas A&M noted specific ASHRAE work that is relevant to the DR effort.

Specifically, ASHRAE has recently completed three research projects - RP1004, RP1093 and RP1050 -

- RP1004 - Methodology Development to Determine the Long-Term Performance of Cool Storage Systems from Short Term Measurements - reviews forecasting loads for thermal storage (i.e.,whole-facility loads) and is relevant to the report. The final report and papers on this project are available from ASHRAE.
- RP1093 - Compilation of Diversity Factors and Schedules for Energy and Cooling Load Calculations - developed diversity factor calculations for simulation and forecasting kWh and kW from interval data.RP1050 - Development of a Toolkit for Calculating Linear, Change-point Linear, and Multiple Linear Inverse Building Energy Analysis Models

Also of potential interest are the ASHRAE Predictor Shootouts I and II. Other papers and reports are covered in the 1093 literature review.

4.0 Development of Demand Response Protocol

Based on the comments received from DR reviewers and the response of the IPMVP technical committee we recommend continued effort towards an IPMVP DR protocol.

The original contract between the CEC, Xenergy and IPMVP envisioned a three-step process. Xenergy was to propose a draft protocol for review, including a workshop. Based on feedback from the workshop and reviewers, Xenergy would submit a final protocol to the IPMVP Executive Committee for potential adoption.

The draft report required more resources than originally expected and, coupled with the unexpected addition of the IPMVP Technical Committee review, it is not now clear that CEC/Xenergy will be able to muster the resources to take the project through the final report phase.

Given the strong technical review of the CEC draft report and broad agreement for an IPMVP DR protocol, the IPMVP has a clear opportunity to contribute to the industry by taking this effort to completion. There remains the question of where to find the resources and how to prioritize this effort in comparison to other initiatives. What follows is the IPMVP-DR team's suggested approach.

4.1 Suggested Approach

Developing a DR protocol would require people with different set of skills and experience in running and evaluating DR programs. As a first step to developing a national protocol, it is proposed that an IPMVP DR subcommittee will be constituted consisting of DR experts that would build on the work already per-

formed by Xenergy. In order to maintain continuity, IPMVP will request the continued involvement of Xenergy in any future work on DR. It is recommended that the following organizations should also be involved when the IPMVP DR subcommittee is formed:.

- Different ISOs (California, New York, PJM, Midwest)
- A selection of Utilities from around the country with experience in administering DR programs
- Organizations/individuals representing customers who will participate in the DR programs
- Consultants who have evaluated DR programs over the last few years

IPMVP, Inc. will develop the protocol and will be responsible for updating and maintaining the document. The deadline for completing the work (electronic availability of the DR protocol on the IPMVP web site) will be May 15, 2003. The first step of the DR Subcommittee would be to develop a plan for completing the DR Protocol. The Technical Committee will oversee the work of the DR subcommittee and deliver a protocol per the project schedule. The Executive Committee of the IPMVP will provide final approval for publication.

Based on the feedback received from reviewers and the guidance received from the IPMVP Technical Committee, the IPMVP DR subcommittee is requested to address the following topics among other issues that it may identify:

- Leverage the analysis performed by Xenergy for CEC but try to limit the main protocol document to around 15 pages with supporting technical analyses contained in appendices.
- Prefer methods that provide simplicity, flexibility, and ease of use and at the same time be technically rigorous.
- Test any methods not considered by Xenergy.
- Make sure that datasets that are used for testing various methods should capture the variances that will be encountered by a national DR protocol.

4.2 Potential Sponsors

The IPMVP envisions continuing the work done so far on the development of the DR protocol utilizing funds from different users. so far. The funds of the order of $100,000-$150,000 will be used to constitute the DR subcommittee, paying for the time of consultants, paying the lead individual/organization responsible for writing the protocol with input from members of the subcommittee, and to cover for IPMVP staff time. Since a national DR protocol can benefit multiple organizations, multiple sponsors should be targeted to fund this initiative. A few potential sponsors of this new initiative are listed below:

- ISOs (CA, NY, PJM, New England, Mid-West, ERCOT)
- Utilities with ongoing DR programs
- National American Energy Standards Board

- Department of Energy
- State Energy Organizations (ASSERTI, CEC, NYSERDA)

Furthermore, IPMVP can do more to identify and foster partnerships with other energy-related associations and standards bodies. The DR protocol can be used as a marketing tool to prove that IPMVP can quickly respond to industry needs.

5.0 Conclusion

The invited review of the draft DR protocol returned a two-part verdict. First, reviews agreed that the report substantiates the need and practicality of a national standard for DR programs. Second, the reviewers raised sufficient substantive concerns and issues to preclude a rapid adoption of the CEC/Xenergy draft. In addition, IPMVP Technical Committee found the CEC/Xenergy draft protocol to be a sound draft from which to create an IPMVP DR protocol. The IPMVP DR team has endeavored to provide the CEC/Xenergy with a useful review and compilation of industry peer comments. We appreciate your cooperation and look forward to future collaboration.

Appendix A: IPMVP Technical Committee Members

- Lynn Coles, R. W. Beck
- John Cowan, Cowan Quality Buildings
- Ellen Franconi, Nexant Inc.
- Jeff Haberl, Texas A & M University
- Karl Hausker, PA Consulting Group
- Maury Hepner, Crothall Asset Management
- Rick Jones, Southern California Edison
- Satish Kumar, Lawrence Berkeley National Laboratory
- Venkat Kumar, Johnson Controls
- Fernando Milanez, Global MVO Brasil Ltda, Brazil
- Demetrios Papathanasiou, International Finance Corporation
- Steven Hauser, Pacific Northwest National Laboratory
- Robert Sauchelli, Environmental Protection Agency
- Steve Schiller, Nexant, Inc.

List of Review Questions Developed by IPMVP and Provided to Reviewers

July 1, 2002

1. Please provide your name, affiliation, and email address.
2. Please check one from the following to describe your professional role in a Demand Response (DR) program?

   ( ) National/Regional Authority on DR Programs
   ( ) DR Program Administrator (Utilities/ISOs)
   ( ) DR Program Facilitator (Consultants, Hardware/Software Providers)
   ( ) Project Participants (ESCOs, Large Facility Owners)
   ( ) Industry Group (Peak Load Management Alliance)
   ( ) Others: software provider, energy analyst
3. If you're involved in DR programs, do you operate in multiple regions? Please indicate the scale of demand response programs you've been involved in (either in terms of the number of projects or dollar incentive amount or both).
4. As a first attempt to develop a consensus set of operational procedures to quantify load reductions, does the document satisfy your needs for the marketplace? If not, what is missing and how can the procedures be improved.
5. Are you satisfied with the manner in which the three fundamental components (data selection criteria, estimation method, and adjustment method) of baseline calculation methods based on whole-premise interval metering been treated?
6. Does the document analyze the existing test methods in a technically rigorous manner? Do you agree with the criteria that were used to analyze the test methods in greater detail? If not, can you point to the technical deficiencies in the analysis. Do you want other test methods to be considered?
7. Does the results from using the test methods on actual datasets make sense? Were the results of the analysis presented in an "easy to follow" format?
8. Do you believe that the analysis contained in the draft report can be used by IPMVP as the basis for developing a national M&V protocol for baseline determination for DR programs? If not, what additional analyses should be conducted before developing a national M&V protocol.
9. If there is a national/international M&V protocol for baseline determination for DR programs, will it be helpful in the administration and management of DR programs? What could be the magnitude of the financial benefit to your organization?
10. Do you have any other comments?

List of Reviewers for Xenergy's Demand Response Protocol

July 15, 2002

Name	Company	Reviewer's Category
Gary Downes		Multiple Market Players
Tom Riley		Multiple Market Players
John Avina[a]	***Abraxas Energy Consulting***	***Multiple Market Players***
Brian Hayduk	AES NewEnergy, Inc.	Utilities
	APX	Multiple Market Players
Gregory Urbin	***Baltimore Gas & Electric Company***	***Utilities***
Jeffrey Trout	Baltimore Gas & Electric Company	Utilities
Srinivas Katipamula	***Battelle PNL***	***Public Interest***
Glenn Perez	***California ISO***	***Program Operators***
Cary Fukada	Chevron Energy Solutions	Multiple Market Players
Lisa Decker	Constellation Power Source, Inc.	Energy Trading Company
Stephen Fernands	***Customized Energy Solutions***	***Consultants***
Pamela Melton	DC Public Service Commission	Policy makers
G. Arthur Padmore	Delaware Division of Public Advocate	Program participants
Gary Myers	Delaware Public Service Commission	Policy makers
Janis Dillard	Delaware Public Service Commission	Policy makers
Joel Gilbert	Demand Exchange	Multiple Market Players
Stephen Huntoon	Dynegy Power Marketing, Inc.	Energy Trading Company
Robert Russo	Electrotek	Multiple Market Players
Lynn Frier	ESource	Consultant
Paul Komor	ESource	Consultant
Michael Griffen	Exelon Generation Company, LLC	Utilities
Gwendolyn Luciano	FirstEnergy Corporation	Utilities
Richard Sparling	FirstEnergy Corporation	Utilities
Jay Zarnikau	***Frontier Associates***	***Consultant***
Rich Hackner	***GDA Associates***	***Multiple Market Players***
	Government Utility	Utilities
Ben Long	ICF Consulting	Consultant
Mary A. Piette	LBNL	Public Interest
Satkartar Kinney	***LBNL***	***Public Interest***
Rajnish Barua	Maryland Public Service Commission	Policy makers
Sandra Hall	Maryland Public Service Commission	Policy makers
	Mid-atlantic Utility	Utilities
	Mid-west Utilities	Utilities
Martin Matijasich	Mirant Americas Energy Marketing, LP	Energy Trading Company
William Derasmo	Mirant Americas Energy Marketing, LP	Energy Trading Company
Carrie Hill Allen	Mirant Americas, Inc.	Energy Trading Company
Richard Jett	Motorola	Multiple Market Players
Rod Beasley	Nexant, Inc.	Consultant

Steve Schiller	***Nexant, Inc.***	***Consultant***
	North-western Utility	Utilities
Terry Black	NRDC/FERC Project	Public Interest
Dave Lawrence	NYISO	Program Operators
Elliot Boardman	Peak Load Management Alliance	Multiple Market Players
Denise Goulet	Pennsylvania Office of Consumer Advocate	Program participants
Glen Thomas	Pennsylvania Public Utility Commission	Policy makers
John Levin	Pennsylvania Public Utility Commission	Policy makers
Stu Bresler	PJM	Program Operators
David Kleppinger	PJM Industrial Customer Coalition	Program Operators
Robert Weishaar	PJM Industrial Customer Coalition	Program Operators
Barry Spector	PJM Interconnection LLC	Program Operator
Sandra Rizzo	PPL EnergyPlus, LLC	Utilities
Paul Russell	PPL Services Corporation	Utilities
Gregory Eisenstark	PSEG Services Corporation	Utilities
Nieves López	Public Utility Commission of Texas	Policy makers
Deno Damaskos	Real Energy	Multiple Market Players
Tom Adams	Real Energy	Multiple Market Players
Michael Briggs	Reliant Energy, Inc.	Energy Trading Company
Randy Edwards	RETX	Multiple Market Players
	San Deigo Gas and Electric	***Utilities/Program Operator***
Peter Livingston	***San Deigo Regional Energy Office***	***Program Participant***
Robert Sonderegger	Silicon Energy	Multiple Market Players
Randy Kurtz	SixthDimension	Multiple Market Players
Linda Low, Mark Martinez, David Reed, Mark Wallenrod	***Souther California Edison***	***Utilities/Program Operator***
	Southern Utility	Utilities
	State Public Service Commission	Policy maker
Walter Hans	TRD Corp	Consultant
Hon. Arlen Specter	United States Senate	Public Interest

a. Bold and italicized text indicate reviewers who provided comments.

Questions

1. Please provide your name, affiliation, and email address.	**John Avina** **Director of Operations** **Abraxas Energy Consulting** **johnavina@abraxasenergy.com**	**Stephen Fernands** **President** **Customized Energy Solutions** **sfernands@ces-ltd.com**	**Rich Hackner** **GDS Associates/Wisconsin Focus on Energy program** **Rich.Hackner@gdsassociates.com**	**Srinivas Katipamula, Ph.D,** **Sr. Research Scientist** **Pacific Northwest National Laboratory** **Srinivas.Katipamula@pnl.gov**
2. Please check one from the following to describe your professional role in a Demand Response (DR) program?	( ) National/Regional Authority on DR Programs (FERC, PUCs, State Commissions) ( ) DR Program Administrator (Utilities/ISOs) ( ) DR Program Facilitator (Consultants, Hardware/Software Providers) ( ) Project Participants (ESCOs, Large Facility Owners) ( ) Industry Group (Peak Load Management Alliance) (X) Others: software provider, energy analyst	(X) National/Regional Authority on DR Programs (FERC, PUCs, State Commissions)	(X) DR Program Facilitator (Consultants, Hardware/Software Providers)	(x) DR Program Facilitator (Consultants, Hardware/Software Providers) (x) Project Participants (ESCOs, Large Facility Owners)
3. If you're involved in DR programs, do you operate in multiple regions? Please indicate the scale of demand response programs you've been involved in (either in terms of the number of projects or dollar incentive amount or both).	N/A	I have been active in the establishment of the PJM and NYISO demand response programs over the past two years.	Primarily in the Midwest	I was technical manager for the DR program for Enron Energy Services from Aug. 2000 to Dec. 2001. I was involved in managing the programs in CA ISO, NY ISO, and New England. We had a demonstrated curtailment load of about 15 MW in the California market and about 10 MW in the New York market. In the New England market we had several hundred customers, but the potential there was unknown.
4. As a first attempt to develop a consensus set of operational procedures to quantify load reductions, does the document satisfy your needs for the marketplace? If not, what is missing and how can the procedures be improved.	Overall, I enjoyed reading this document, and felt honored to be included in your stable of reviewers. I learned much from reading the document. I have not been asked to critique anything since undergrad, so, please, do not find my remarks unpleasant. I was trying to be of value to you and to point out what I think are inconsistencies and weaknesses in the paper. I did such with humble intentions. I would enjoy doing this again in the future.	The document goes a great deal towards illustrating the various methods and the accuracy of the methods. Probably one of the best conclusions is that model sophistication does not necessarily translate into model accuracy. It is also very good at laying out a good set of methods that could be used to measure load reduction so parties don't have to go through what those of us in PJM and NYISO went through in developing the wheel for ourselves and then trying to sand down some of the square corners after the fact. However there are difficulties in implementing some of your suggestions. You suggest at one point allowing for the individual customer methodology proposed by PJM (executive summary X-10.) One of the difficulties in implementing the suggestion that business type, load patterns, and the customer's "description of operating practices" be used is the ambiguity of the requirement. Although a utility with a captive customer for a significant amount of time might be able to accurately ascertain this information in a competitive market with changing LSEs neither the LSE/ CSP serving the customer	I think that what has been presented is a very good first cut. I can see where it provides useful information and comparisons between various demand calculation methodologies. The comments regarding discretion being necessary when dealing with individual customer load profile was very appropriate. There are going to being circumstances where fixing on one methodology will not work in all cases, i.e. "one size doesn't necessarily fit all" Bottom-line is that all parties need to agree up-front on the method and that all believe that it presents a fair result.	The document is a good start. It could have been better organized. A section can be added to suggest which methods are better suited for which customers. For example, most office buildings the method used by New England ISO suites better. For Industrial customers with temperature independent load CA ISO or NY ISO methods suits best. The document did not address Industrial customers whose load is not temperature dependent by dependent on the product they produce. None of the methods used by ISO's can be used effectively, because they generally tend to underestimate the load significantly.

Responses

Saki Kinney, LBNL, SKinney@lbl.gov	Peter Livingston, PE, CEM San Diego Regional Energy Office Program Manager pli@sdenergy.org www.sdenergy.org	Baltimore Gas and Electric Company Gregory Urbin (Gregory.M.Urbin@BGE.com) Mary Straub (Mary.M.Straub@BGE.com)	Glen Perez Compliance Audits Manager, California ISO GPEREZ@CAISO.COM	Linda Low (Linda.Low@sce.com) Mark Martinez (Mark.S.Martinez@sce.com) David Reed (David.Reed@sce.com) Mark Wallenrod (Mark.Wallenrod@sce.com)	SDG&E
(x) Others		(x) DR Program Administrator (Utilities/ISOs)	(X) DR Program Administrator (Utilities/ISOs)	(X) DR Program Administrator (Utilities/ISOs)	(X) DR Program Administrator (Utilities/ISOs)
We worked with an ISO 2001 DRP participant on demand response strategies and assisted with analysis of their performance and program participation.		BGE operates a number of demand reducing programs. In particular, it operates a curtailable program, that when operated the participating customer is required to drop to their contractual load level. BGE also operates a voluntary program, where participants opt in at their discretion.	I have been involved in the development and implementation of California ISO's Demand Response Programs (Summer 2000 and 2001) and the Discretionary Load Curtailment Program (2001). Additionally, I have been involved in the Participating Load Program, which allows Loads to bid into the non-spin ancillary service market. Our programs have been operated through out the California ISO Control Area. I have also been actively involved in the development of the State of California's Demand Bidding Program.	Southern California Edison (SCE) operates a portfolio of demand response programs within its service territory. Located in Southern and parts of Central and Eastern California, exclusive of the municipal utility service areas (LADWP, Riverside, Anaheim, etc.) and SDG&E in the San Diego area, SCE serves over 10 million residents in an area of approximately 50,000 square miles. SCE's current programs include reliability-based load management and load reduction offerings, along with metering and pricing options designed for residential, commercial and industrial customers. SCE controls nearly 1,000 MW of curtailable load.	In general, SDG&E agrees with the techniques recommended by Xenergy to the CEC to calculate baseline loads. However, SDG&E has some concerns regarding Implementation and Sample Selection, as described below.
It should be a great tool for DR programs. Additional recommendations that would be useful for DR programs considering a weather baseline would be for 1) weather data and 2) aggregating data (in the case of partipicants with loads with different types, climates). On the first point, 'official' weather data are available for a limited number of locations, particularly for hourly data, and depending on microclimates in the particular region, some climates will vary from the weather station location more than others. 'Unofficial' or locally-metered weather data is generally less reliable when available. In any case, daily data are more practical to obtain, and in the case of peak temperature, forecasts are widely available. The second point, the aggregation, could introduce complexity for participants with multiple loads for some methods, particularly across different climates and types of loads.		Yes	I believe it provides significant information that will help entities that are developing demand response programs (specifically ones that are system emergency based).	The data (load shapes) do not include any experience from California nor does Xenergy provide any analysis of transferability of results to the California sector. This is one of several important criteria needed to set up similar rules of baseline estimation and demand reduction that can be used across all geo-specific customer groups in California, especially for the weather conditional models cited in the report. Further analysis of the proposed baselining approaches and demand responsiveness from summer peaking customers in the Western United States, in both industrial and commercial sectors, would provide additional data to test both the regression and adjustment performance measures. The robustness of the national data would be enhanced and the methodologies more usable for California when calibrated for customers on the West coast. Additionally, SCE's experience indicates that for a program to be successful a baseline should be both simple to understand and administer. Any benefits derived from more empirical	The report provided to the CEC by Xenergy recommends that a simple hourly average with additive adjustments to the last 2 hours prior to the event be used as "default" baseline calculation with alternative baseline calculations if the customer wants to cut load before the curtailment period or if the customer is involved in gaming. Although SDG&E supports calculation of baseline loads using the last 2 hours prior to the event, we cannot support, and in fact, strongly oppose, any methodology that requires evaluation on a case by case basis. The Xenergy report recommends using case by case evaluation to identify customers that reduce load as much as 3-4 hours prior to the event. Although SDG&E concedes that this may occur infrequently, we submit that it would be infeasible to write a tariff that would allow for such customized evaluations, and that these evaluations would not only be burdensome to implement, but the results would be arbitrary in nature. Finally, SDG&E believes it is extremely important to have consistency across all Demand Response programs in term

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(X) DR Program Facilitator (Consultants, Hardware/Software Providers)	(x) DR Program Facilitator (Consultants, Hardware/Software Providers)
Most regions of country. Many MW.	Co-Chair of ERCOT Demand Side Working Group Formerly a VP at Planergy, where I had some involvement in curtailment programs in NY, Indiana, Michigan, and Texas.
See attached comments.	Yes. It is very comprehensive.

5. Are you satisfied with the manner in which the three fundamental components (data selection criteria, estimation method, and adjustment method) of baseline calculation methods based on whole-premise interval metering been treated?	Yes, pretty much. I could not understand some parts.	Yes, I think this is a reasonable and good process.	Yes.	For the most part, the treatment of non-weather dependent and non-constant load methods was missing. It is conceivable that one could use the weather dependent estimation methods with different independent variables.
6. Does the document analyze the existing test methods in a technically rigorous manner? Do you agree with the criteria that were used to analyze the test methods in greater detail? If not, can you point to the technical deficiencies in the analysis. Do you want other test methods to be considered?	No, I think it does not. I have three major points: Weather Regression Although weather regression using DDs appears to be the most accurate, it wasn't fairly represented. As you stated, each building has a different balance point. We both know that the selection of balance points can drastically affect the baseline values especially at extremes. By testing the regression method at some arbitrary balance point, you have unfairly biased the test against regression (even though regression, handicapped, as it was, did well). How good is good enough? The need for a threshold This is another issue that really isn't addressed. When energy analysts look at their regressions for M&V, does it matter to them that one regression has an R^2 =0.95 and the other has an R^2 =0.94? For many, probably not. The difference may be moot. Anything above 0.75 has been deemed acceptable. Coming from an M&V background it is my belief that it isn't necessary to be correct (since there is no such thing), just be within some generally accepted threshold. I think readers would be better served if some acc Recommendations The analysis for accuracy in several criteria is very nice, howe I think that a better presentation would be something like you	Although I did not do a rigorous review of the analysis it appears to take into account the most relevant issues involved with load variability and customer type.	In analyzing a number of load data sets and attempting to predict loads based on more or less data if you were within 15-20% of the actual you were probably in good shape. In other projects where predictive methods were used the degree of accuracy often times was a tradeoff with the level of data intensity required, i.e. you can, to a point, improve accuracy with more types and quantities of data. However, there is a point of diminishing returns. The report makes several points regarding the desire by owners and DR program people for a simple, relatively straightforward approach. This should be a key criteria when selecting/applying any method. There are going to be cases where "gaming" occurs and there may not be ways to completely eliminate it form ever occurring . Allowing discretion as to what method may be used for unique circumstances is certainly one way to help minimize gaming. The "silver lining" if you will from gaming, is that in one sense if someone is willing to put the effort into developing strategies to "game" the system then they are becoming a m	There is not enough information in the document make a judgment.
7. Does the results from using the test methods on actual datasets make sense? Were the results of the analysis presented in an "easy to follow" format?	Yes. Almost. It would have been easier if the A1, A2, etc. were defined on each graph rather than 3 or 4 pages prior.	I believe that using actual datasets makes this a much stronger review. For those of us (i.e. me) less familiar with Theil's U there was a little more work making sure I understood the implications of what you were saying. But after a little work I was able to get it. The graphical representations of the data in the results was most helpful.	Yes.	To some extent it does, but based on my experience there every building analysis is different.

Yes. Work is thorough.	The sample selection used in this study is comprised of mostly non-California interval load data. In fact, less than 1% of the sample sites were from California (4 out of 530). Electric loads in California, and especially in San Diego, are generally less weather sensitive than the rest of the nation. Therefore, it is impossible to conclude that the results are directly transferable to California's unique Electric Market environment. In order to ensure that the data accurately represents demand response for its customers, SDGE would like to have an opportunity to analyze its current program participants utilizing the proposed methodology.	Yes	Yes. I would have like to see if it was possible to review end use load that participated with a specific device that they would always either turn off or put into a pre-selected condition. For instance, if a customer would always turn off a waste transfer pump, then would it be reasonable to measure the demand and use that specific value to determine the amount of load curtailment. This has the possibility to allow customers that don't have interval meters to participate. However, Some confirmation scheme would have to be implemented.	Yes.
Yes it is technically rigorous. My current personal favorite method not included is an autoregression model based on hourly power usage, ie, a regression of power vs. its lags. This can compensate for temperature and other variation and you don't need to deal with temperature data.		Yes	I am satisfied.	The primary deficiency with respect to the testing of existing estimation methods is the omission of results by customer segment and/or load ranges. While the results for the 646 accounts tested as a whole (or in the weather sensitive (WS), non-weather sensitive (NWS), high variability (HV) or low variability (LV) sub-groups) may be statistically significant, the report does not provide assurance that the results can be applied uniformly across customer segments or load ranges. The study's recommendations may well be valid for customer segments, but there is nothing in the report to support that conclusion.
Yes. Results are more or less as expected and analysis and conclusions well presented.		The document in areas is extremely technical, and the format was somewhat choppy. I was not always able to follow the analysis approach. Some of the graphs were difficult to decipher, for example, graph 2-2 and 2-3. The document reads more like a FERC filing, constantly repeating itself, than a technical report.	I think this is the best test method available. It is easy to understand by us non-technical people and it is easy to explain. The presentation was easy to follow.	The load data assessment was extremely detailed, and could only be faulted on the lack of transferable data for California customers. The results were presented generally in an easy-to-follow format.

See attached comments.	Yes.
See attached comments.	Yes.
See attached comments.	The charts were a bit confusing and too voluminous. Otherwise, it made sense.

8. Do you believe that the analysis contained in the draft report can be used by IPMVP as the basis for developing a national M&V protocol for baseline determination for DR programs? If not, what additional analyses should be conducted before developing a national M&V protocol.	Yes. Just change the presentation of the recommendations. I would have tested regression using variable based balance points as well.	I think that this could be used as a basis for a national M&V protocol. Since it is a give and take I imagine that a negotiation process will still take place.	I think the report can be best used to highlight the advantages and disadvantages from the various methodologies and offer suggestion on what choices are available. If there is any additional information needed it would be to consider adding in some information regarding various program objectives/criteria/scenarios then offering suggested methods which will best meet/serve those program specifics.	I think it is a good staring point.
9. If there is a national/international M&V protocol for baseline determination for DR programs, will it be helpful in the administration and management of DR programs? What could be the magnitude of the financial benefit to your organization?	Yes. This is a wise thing to do. It would be best if decision makers at ISOs and utilities had a standard like this to rely upon.	Yes, this could be helpful and ease the administrative burdens on the demand response systems and reduce marketing costs considerably. I do not know the magnitude of the savings. The challenge exists in regional variations to any baseline due to customer mix and typical weather and usage patterns.	Yes, certainly there is value in being able to compare across programs if a common standard is used. Unknown.	Having a standard approach certainly will help to develop tools that can be widely used. However, it is important to get the governing bodies (ISOs, PUCs) agree to a standard.
Do you have any other comments?	Typos or errors: · Page 5-3 at bottom of page, 3 paragraphs under Figure 5.1: It says "The figure shows that unadjusted weather model ('0') has only slight negative bias, -0.5 percent. " The graph doesn't show this. · Figure 5-2 and others: The scale of the graphs can be misleading to those who skim. Because 0 is not in the Y axis, it looks like there additive 1-2 is bringing the error near to 0. It might be better to present the graphs with a 0 at the bottom of the Y-Axis, and the squiggly line on the Y-Axis, that shows that the scale is not continuous from 0 to whatever. · Section 5.2.3: "Thus, to the extent operations on different from those in the baseline days…" "on" should be "are" · Section 5.2.3, last paragraph: I don't understand this at all.	No.	Although there is potential for gaming, it shouldn't be criteria in the selection of the methods. There are ways to make sure the situation doesn't arise, for example, giving them 30-minutes notice of curtailment.

As the question is stated, yes, for baseline determination of DR programs. Additional analyses would be needed if IPMVP wished to develop protocols for situations outside of DR programs. For example, in some situations, such as program evaluation, accuracy may outweigh simplicity and gaming concerns, and a different approach may be appropriate. Several 'desireable features' are given in section 2.2.2 – it would also be interesting to add a summary table to the recommendations section that compared baselines by these criteria.

We are not managing a program, but just having this document would have saved time and confusion as we had to come up with our own method to illustrate that GSA's performance was greater than calculated by CA ISO's method. Future financial benefit would depend on DR program structure and GSA's participation, which likely would not depend on the program baseline choice -- bureaucracy was a bigger problem, further complicated by having to use a middleman (load aggregator).

You state that for nonsummer loads the weather models are no better than the average. Presumably this is because the 'weather sensitivity' has to do with cooling loads – it's probably not significant for DR programs, but it seems reasonable to assume that a building with electric heat might behave differently.

Lastly, LBNL citation was incorrect – 'LBNL approach' was used to illustrate need for weather correction and DR performance by GSA in a memo from myself to Mark Levi labeled as draft. The memo, dated 11/3/01, was titled 'Effect of temperature on the baseline for Summer DRP'.

As stated in the document there are pros and cons to each baseline approach. I believe that a national M&V protocol will be difficult to arrive at due to the various nuances in each approach. The final product should allow curtailment service providers a choice on which method they can apply to their various customers curtailment profiles.

We have approval from our PSC and our ISO with regard to our baseline approach. This document supports our overall choice, previous day average with a scalar adjustment. I do not think a national protocol is required. I think the guidelines and findings are sufficient.

The biggest fear in developing baselines is that they become so complicated that the average Industrial and Commercial customer becomes confused and dis-interested. Complicated baseline calculations become very difficult to sell to individuals whose main goal for the day is not load curtailing. I believe the complications are compounded by curtailment providers fear of "gaming". If you have a simple baseline and you see "gaming" you deal with it on an individual basis and not develop a broad sweeping complicated calculation.

I don't feel that I can add anything valuable to baseline development. However, having been a participant in DR programs involving baselines, I can make some comments from the customer perspective.

The presentation of the baseline in a user-friendly format is important. The ABB EPO did not show the actual differential required to meet the demand reduction goal. When financial penalties are involved, both graphical and tabular data is required. If a customer has to meet a specific kW reduction for each hour, in most cases, they must start the load shed before the start of the curtailment period to make up for the thermal lag in the building. A more reasonable request is to have less load reduction in the first hour and make up for in in the latter hours. It seems like one baseline method is unacceptable, but several would become too confusing and hard to implement. Maybe four alternatives. Seems like there may be a difference between what is actually the most fair and what the customer may perceive as fair. Weather-corrected may seem more fair than previous two hours averaged.

BGE is Utility B. In Table 3-1 under data selection, there is a comment that "Customer Specified anomalous loads" were excluded from analysis. Is that something done by Xenergy? BGE's former baseline was the average the five previous non-holiday, non-curtailment, weekdays.

Page 5-2 bulletized list – notation needs clarification.
BGE modified its baseline for summer 2002 curtailments. The new baseline adjusts the actual load to the profile load one hour prior to the customer commencing their curtailment. The profile is not adjusted during the curtailment period.

I can not comment due to my lack of knowledge of the IPMVP process.

I think a national standard makes the development and implementation of a program much easier. Clearly there will no longer be a debate on what is the proper method to measure a curtailment.

Although the report is large, it was easy to understand. It was unfortunate that you were unable to get more California customers involved. I found that many of the customers that participated in the CA ISO's programs were very supportive and would have been willing to work with you.

Knowing that the IPMVP protocols are illustrative and not prescriptive, it makes sense to provide the IPMVP committee with this information for peer assessment. The committee review process will provide the appropriate screens for technical assessment, and then can be placed as a recommended practice for adoption as the industry sees fit.

No, a national/international M&V protocol for baseline determination for DR programs is not necessarily helpful in the administration and management of DR programs. The primary factors affecting the administration and management of DR programs are those enumerated in Section X.2.2 of the report, especially simplicity, ease of use, ease of understanding, ease of implementation by both the customer and the Administrator and the ability of the customer to know its appropriate commitment prior to an event. SCE has applied these standards and will continue to apply these standards to its baseline development. Furthermore, customer confusion and dissatisfaction resulting from changing baselines from those that customers are now familiar with to new national protocols, as well as the administrative issues related to customer training and education, modifying contracts and the potential loss of curtailable load may

The report makes reference to the assumption that inconsistent baselining methodologies for DR programs have been both hurdles for program participation and caused dissatisfaction with participants, and this was inferred in the executive summary and introduction of the report as the purpose for the study. This assumption is very out of context for this type of report, and the statements do not reference any supporting documentation. It seems that the approach to compare and calibrate baseline techniques to improve accuracy and provide program benefit parity should serve as valid reasons enough to conduct the study.

SDG&E appreciates the opportunity to comment on the results of the Xenergy study, "Protocol Development for Demand Response Calculation: Draft Findings and Recommendations." We believe that it provides valuable insight into existing baseline calculations. However, SDG&E encourages further analysis based on California loads, and finally, SDG&E discourages any methodology change which is not applied consistently across all DRP programs, and individually customized baseline calculations.

	Yes, very good start. See attached comments.	Yes. But some discussion of the costs of implementing alternative approaches would be useful.
	Yes.	Yes.
	See attached comments.	Chapters 1 and 5 should be shortened.

Steven Schiller (Nexant) Comments on Xenergy Study:

Protocol Development for Demand Response Calculation dated August 1, 2002

Nexant's comments are provided in two sections, below. The first section covers summary and general comments specific to the content of the Xenergy study. The second section provides comments on the report based on Nexant's direct M&V experience with evaluation of CEC's demand responsive programs in 2001 and 2002 (funded by AB 970 and SB 5X). The latter section focuses on recommendations to support development of an IPMVP proposal for demand responsive baseline methods.

SECTION 1:

Summary Comments

Our summary comments are:

- This is an excellent report, well prepared and documented. The analysis methodology and assumptions appear logical and reasonable. It provides definitive value for all future demand response programs.

- The results and recommendations mirrors Nexant's M&V experience for summer weather and non-weather sensitive loads. Specifically, the approach we used for the CEC demand response programs, a ten day average with a prior hour adjustment coincides with Xenergy's generic recommendation for demand response program M&V (Nexant used a one hour before adjustment, Xenergy recommends one to two hours). Thus, what we found to be the best approach for the CEC is collaborated by Xenergy's recommendation.

- We have some suggestions for clarifications and presentation of results. These are described below and three key suggestions are mentioned here:

    - The recommendations in Section 6.4 "Proposed Approaches by Load Type" and Table 6-3 should be brought forward to the executive summary and expanded, possibly through additional data analyses, to include load types and situations that do not work with the recommended approaches or for which there was insufficient test cases to develop a definitive opinion. The primary recommendation of using the last ten days with a one to two hour adjustment could be stated right up front.
    - Methods should be defined for subjectively or objectively identifying gaming when using the various recommended approaches, particularly the ten day average with prior hour adjustment approach.

- There appears to be no analysis of just using the load two hours (or one hour, or 3 or 4 hours, e.g. PJM Emergency – Table X-2) before the curtailment as the baseline without using averaging or regression analysis of prior days. Given the overall recommendation, it would appear that this approach should be tested in the same manner as the methods described in Table 5-1.

General Comments

- Please indicate the time period during the day for which the analyses were conducted and the errors reported. For example, were the analyses completed using noon to 6pm or 24 hour data?

- I would suggest more information on the types of loads that were tested (types of facilities, characteristic of their uses and load profiles) – for both the participants and non-participants in DR programs. This would be helpful for defining the limits of the modeling and recommendations. I suspect that there are some load types that are not represented or not represented in significant numbers and for which conclusions cannot be drawn from the completed analyses. In addition, the 95% percentile analyses indicate that the methods do not work well for certain types of loads; perhaps these could be described. To help define this, more information on the variance of errors across different loads would be useful.
  - For example, what about small loads – a curtailment program for small commercial customers –would the results still apply. It appears that the error analysis, for some tests (Theil's U), considered errors on large load customers more heavily than small loads.
  - Overall I suspect that the results apply to many, many situations, the suggestion is to simply to point out where these results apply and don't apply. This suggestion comes, in part from occasional language in the report that makes qualitative statements when comparing certain methods, such as "somewhat better" in Section X.3.2. I think the point is that a professional judgment has been made that one approach is better than another and that without using confusing statistical parameters this point needs to be made. However, it would be useful to state the limits of such a statement, such as "in our judgment, base don the analyses conducted" this is a better approach under 'such and such' circumstances.

- The reporting of bias and overall errors for non-participating loads is comparing predicted with actual loads. The reporting of bias and overall errors for participating loads (I believe both baseline and curtailment amount) were based on comparing predictions with the "best guess" – full season weather modeling. This approach is logical and I think a good approach. However, this approach, which can be a source of systematic bias in itself, should be pointed out more clearly and early in the report (Section 5.1 and Section 5.6.1)

- Table X-1 and a sentence in Section 2.2.3 describe problems of certain methods that use weather data as problematic of the loads are not very weather dependent. As pointed out later in the report proper testing of models will tell if a factor such as weather is relevant to he prediction. Thus, it may be better to say that the "con" of any modeling, beyond using simple averages, is that it may be done improperly and that good modeling is dependent on the use of experienced modelers.

- In several places I was confused by terminology related to high or low load predictions when I was looking for the key indicator to be "high or low estimates of the amount of load curtailed during an event". The terms "understate load" (Section X.3.1), negative and positive bias (Section X.3.2), and negative or positive relatively hourly error (Sections 4.5.1 and Section 5.1) were terms used to describe accuracy of methods. For example, in Section 5.1 it is stated that "Median relative hourly error less than 0 indicates a systematic tendency to understate baselines and load reductions". It would seem that an understated baseline would lead to an overstated load reduction. Please clarify.

- In section 4.1.2 "Models Tested" it appears that all of the regression analyses used weather models and that no testing was done using non-weather variables such as process or occupancy related variables. This is probably because such data are hard (to impossible) to come by. Some commentary may be appropriate since non-weather dependent loads may correlate well to other factors that may be usable, in particular for large industrial loads.

- It is possible (probable) that demand response programs will become less frequently used, when used, for more unusual situations – not necessarily weather extremes where the curtailed loads are located. For example, in the fall of 2000, Southern California loads were curtailed due to unusual weather conditions in the Northwest that resulted in less power flowing to Southern California. Thus, weather in Southern California was irrelevant to the curtailment. Consideration in approaches or commentary could be thus made that curtailments may not always be on extreme weather days and thus extreme weather baselines may overstate baselines in some situations.

- Overall I found the report to be very well written. One main suggestion would that Executive Summary could be shorter and written more to the conclusions and recommendations, Table 6-3. Note defining THI in Section X.5.1 would be helpful. Later in the report it would be useful to define how the THI is derived and why it is used versus just a temperature index.

- The analogies to IPMVP Options A, B and C (Section 2.2.1) seem to be a stretch and don't really add value to the report. I would suggest dropping them.

- Page 2-5. Second paragraph, second line – what "figure above"?

SECTION 2:

Nexant was a method donor to the Xenergy study, and the following comments are based on Nexant's M&V experience with the CEC 's demand responsive program (funded by AB 970 and SB 5X). Nexant applied two types of baselines to over one thousand accounts that exhibited a wide range of facility and load types ads well as curtailment strategies. Generally, the Xenergy study validates Nexant's evaluation methodology and acknowledges many of the logistic challenges that Nexant encountered in evaluating summer weather and non-weather sensitive loads within California. Consequently, the following comments do not seek to critique the Xenergy study; rather they are focused on supporting the crafting of recommendations to the IPMVP for demand responsive baseline protocols.

- If there was information collected for the Xenergy study that allows for a "weighting" of criteria for baseline method selection, this would be extremely useful in developing an IPMVP proposal. Nexant emphasizes the criteria that favor simplicity if only at the cost of small compromises in method accuracy. Specifically, a) simplicity, b) ease of use, c) ease of understanding, and d) costs for participant and operator to implement are Nexant's more heavily "weighted" criteria as our experience has shown that these are essential to the uses of a practicable baseline method (e.g. measurement, verification, settlement).

- While the use of regression-base (full season) weather models, appear to minimize variability and bias, there is likely to be difficulty with establishing consensus on a regression models that can be applied universally. In addition, there are formidable practical challenges to collecting temperature data for all accounts in a given program. Nexant has found that the collection of temperature data is difficult and inconsistent across a program population such that it would not justify the relatively small improvement in baseline accuracy over methods based on load averages with additive or scalar adjustments. Optimization of standardized regression models may be illusive, given a broad range of facility types, load types and climate zones to which they may will be applied. Similarly, to optimize regression models, full seasonal load data should be sought, although this also presents challenges for data collection, analyses and settlements of curtailments occurring early in a summer season. If standardized regression models are considered as alternative evaluation methods, minimum r^2 values should be specified.

- Nexant supports the study's conclusion of a default baseline method with alternatives to address specific analytical problems as identified in the report. Nexant has found that fully-customized baseline methods specified by accounts or aggregators greatly expand the challenges of standardized evaluation and challenge prospects for equitable account settlements. Customization of baseline

methods left entirely to the account or aggregator perhaps creates the greatest opportunity for gaming.

- Overall, Nexant has found that the default baseline method suggested in the Xenergy Study (additive adjustment method based on average loads in the 2-hour period prior to curtailment) is a practical default method for summer loads when applied to both weather-sensitive and non-weather sensitive accounts. Nexant's preference for methodological simplicity and standardization leads to a recommendation that alternative baseline methods are limited in number and to the extent to which they deviate from the default method. Alternatives should be pre-established and assigned to address specific problems associated with load types and other conditions of individual accounts (e.g. load shapes, load variability, curtailment strategies, and operational inconsistencies), many of which were identified in the Xenergy report. The following are suggestions for the application for practical alternatives to Xenergy's recommended default method:

    - Changes to the specified (pre-curtailment) hours of the "additive" period can be adapted specified to program design. For example, if a program deploys hour-ahead bidding, the additive period could be set to the hours preceding the time in which the bid is initiated – this would eliminate or reduce gaming potential. Similarly, if program implementation entails day-before bidding, baseline days would only be drawn from days prior to the bidding process.

    - Changes to the specified (pre-curtailment) hours of the "additive" period can be pre-selected by the account based on the specifics of their curtailment strategy. For example, of curtailments are initiated one hour in advance of the designated curtailment period in order to reach maximum load shedding at the beginning of the curtailment period, the account's additive period could be set to 2-3 or 3-4 hours prior to the curtailment.

    - Customization of baseline methods by accounts should be limited to the selection of baseline days, if used in conjunction with the additive or scalar adjustment methods. Specifically, customization of baseline days would be warranted for anomalous load conditions and could be carried out through selection of similar temperature days (to curtailment event) or other forms of day-typing (where load shapes are patterned to specific days).

- Nexant concurs with the report's findings on problems associated with additive or scalar adjustments to baselines, based on the two-hour period prior to the designated curtailment period (Nexant used one hour before in their method). Problems associated with account gaming and pre-cooling are

plausible, and Nexant encountered several cases of premature initiation of load shedding that confused the weather-based scalar baseline adjustments.

- Baseline Issues not addressed in the report:

    - What allowances should there be for use of baseline days that follow curtailment events? Baseline days after curtailments create a greater potential for gaming, but may be warranted to compensate for faulty or missing data preceding events.
    - Guidelines may be needed for the handling of missing data values in pre-curtailment and curtailment period for both baseline and curtailment event days. Missing values in data interval streams will adversely affect any method based on averages.
    - What features of baseline methodologies can be deployed to identify and disqualify gamers; how can their efforts be differentiated from legitimate and intentional load variations prior to curtailment events (e.g. pre-cooling).

- As a final comment, there should be a strong educational component on the "rules" of baseline methods as early as the recruitment phase of program implementation. Understanding baseline methods and devising appropriate curtailment strategies are essential to program adoption and the optimization of program performance by both individual accounts and in aggregate. Once established, default baseline methods and a limited set of alternatives should not change; accounts need to be able to make informed decisions on the baseline alternatives that match their circumstances and allow for the optimization of curtailment strategies and an efficient process for evaluations and settlements.